



PATENT

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

IN THE APPLICATION OF:

LAURENCE NELSON BASCOM ET AL.

CASE NO.: HT3985USNA

APPLICATION NO.: 10/806,584

GROUP ART UNIT: 1771

FILED: MARCH 23, 2004

EXAMINER: ULA CORINNA RUDDOCK

FOR: REINFORCED NONWOVEN FIRE BLOCKING FABRIC, METHOD FOR  
MAKING SUCH FABRIC, AND ARTICLES FIRE BLOCKED THEREWITH

**SECOND DECLARATION UNDER 37 C.F.R. 1.132**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

I, Warren F. Knoff, state:

That I hold the position of DuPont Fellow in the DuPont Advanced Fibers Systems business unit of the DuPont Company. I have a Bachelor of Science in Chemistry from the University of Delaware and a Masters of Science and Doctor of Philosophy in Physical Chemistry from Princeton University. I have been conducting product/process research and development in the field of fiber science and engineering for 33 years.

That I am a co-inventor of patent application Serial No. 10/806,584 filed March 23, 2004 entitled Reinforced Nonwoven Fire Blocking Fabric, Method For Making Such Fabric, And Articles Fire Blocked Therewith.

That I addressed in my earlier Declaration Under 37 C.F.R. 1.132 signed May 10, 2006 two rejections under 35 U.S.C. 103(a) based on

(a) (1) Erb, Jr. et al. (U.S. 2002/0182967) in view of (2) Matsuda et al. (U.S. 5,316,834), and (3) Assink et al. (U.S. 2004/0028958, and

(b) Corner/U.S. 2003/023250 in view of (2) Matsuda et al. (U.S. 5,316,834), and (3) Assink et al. (U.S. 2004/0028958) (i.e. rejections (a) and (b) are similar except (a) employs Erb et al. while (b) replaces Erb et al. with Corner).

That I have been advised that an Office communication dated July 31, 2006 in paragraphs 4 and 8 states:

4. The declaration under 37 CFR 1.132 filed May 19, 2006, is sufficient to overcome the rejection of claims 1-12 based upon Erb, Jr. et al. (US 2002/0182967) and Corner US 2003/0232560).

. . .

8. Applicant's arguments with respect to claims 1-12 have been considered but are moot in view of the new ground(s) of rejection.

That I have been advised a new rejection under 35 U.S.C. 103(a) has been applied in the Office communication dated July 31, 2006 namely:

7. Claims 1-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hainsworth et al. (US 6,955,193) in view of Erb, Jr. et al. US 2002/0182967) and Matsuda et al. (US 5,316,834) and Assink et al. (US 2004/0028958).

That I state in reply Hainsworth et al. U.S. 6,955,193 (also referenced herein as Hainsworth) is in addition to the combination of three publications which I addressed in my earlier Declaration namely Erb, Jr. et al. U.S. 2002/0182967, Matsuda et al. U.S. 5,316,834, and Assink et al. U.S. 2004/0028958 (referenced below as Erb (or Erb, Jr.), Matsuda, and Assink respectively.

That I note the Office communication dated July 31, 2006 states concerning Hainsworth:

Hainsworth et al. disclose a fire resistant textile material. The material comprises a woven faced fabric comprising m-aramid fibers and a woven back fabric of low thermal shrinkage p-aramid fibers

(abstract). The low shrinkage fibers are preferably disposed behind the face fabric (col 3, ln 10-11). The low thermal shrinkage fibers form an interwoven backing fabric on the back of the face fabric (col 3, ln 18-20). It should be noted that the Examiner is equating Hainsworth's low thermal shrinkage p-aramid fibers to Applicant's heat-resistant organic fibers and Hainsworth's woven faced fabric to the open mesh scrim of the present invention. The thickness of the fabric is increased from 0.7 mm before exposure to 4.3 mm after exposure, i.e. fabric increases its thickness between 2 and 10 times (col 6, ln 17-20 and claim 18).

That I further note the Office communication states the following conclusions concerning a combination of Hainsworth, Erb, Jr., Matsuda, and Assink namely:

It would have been obvious to have made the woven fabric of Hainsworth be the scrim of Erb, Jr. et al., motivated by the desire to create a fire resistant fabric that has strength yet is lightweight. It also would have been obvious to have used Matsuda's crimping process on the p-aramid fibers of Hainsworth et al., Jr. et al. and Assink et al., motivated by the desire to create a fabric that is lightweight and has excellent mechanical properties. Finally, it would have been obvious to have used Assink's polyester fiber binder or polyester powder binder on the fabric of Hainsworth et al. and Matsuda et al., motivated by the desire to create a fabric having greater strength and load-bearing properties.

That I consider the above conclusions to be in error.

That I believe the issue is whether one of ordinary skill in the art would modify Hainsworth in view of the teachings and disclosures of Erb Jr., Matsuda, and Assink.

That I note the Office communication addresses the following deficiencies of Hainsworth, namely:

Hainsworth et al. disclose the claimed invention but fail to disclose that the woven fabric is specifically a scrim, that the p-aramid fibers are crimped, and that the p-aramid fibers are held in a compressed state by a thermoplastic binder.

That I consider the Office characterization of Hainsworth in the wording:  
“Hainsworth et al. disclose the claimed invention . . . .” to be incorrect because the Office wording following “but” above represents, for all practical purposes the compositional and structural limitations of claim 1 of my patent application

That I provide a direct comparison of the Office wording vs. the wording of claim 1 of my patent application as follows:

### Office Wording

...but fail to disclose that the woven fabric is specifically a scrim, that the p-aramid fibers are crimped, and that the p-aramid fibers are held in a compressed state by a thermoplastic binder.

vs.

### Claim 1 of my patent application

1. A reinforced nonwoven fabric for fire blocking an article, **comprising an open mesh scrim having a first side and a second side, the first side having crimped, heat-resistant organic fibers compressed thereon, the fibers held in a compressed state by a thermoplastic binder, wherein when the fabric is exposed to heat or flame, the fabric increases its thickness by at least three times.** (emphasis added)

That I note the following disclosures in Hainsworth regarding the increase in thickness of his invention (on column 2, lines 10 to 14 and column 6, lines 17 to 20 and claim 18----which two latter citations are cited by the Examiner in support of the Office position):

As there is **higher shrinkage** in the fibre on the surface of the fabric after thermal exposure than those on the back, the back fabric will buckle and there will be an **increase the air gap** between the layers. (emphasis added)

. . .

The thickness of EX312 fabric has increased from 0.7 mm before exposure to 4.3 mm after exposure, **with air being trapped between the layers.** This compares to the standard fabric

increasing from 0.65 mm before exposure to 1.22 mm. (emphasis added)

. . .

18. A woven textile that increases in thickness between 2 and 10 times **by differential shrinkage of fibre woven in the fabric**, after exposure to a heat flux in excess of 40 KW/m<sup>2</sup>. (emphasis added)

That I assert that the mechanism of fabric increase in thickness in Hainsworth to be completely different than the mechanism of fabric increase of my invention and accordingly modification or replacement of the mode of fabric thickness increase of my invention in Hainsworth would be contrary to the requirements of this prior art publication.

That I consider it may be helpful to make several statements.

That I state, in summary, that, in Hainsworth, the mechanism of thickness increase by means of the creation of an air gap between the woven fabric sides (face and back) is based on a difference in thermal shrinkage between the two side fibers versus the invention of my patent application based on use of crimped compressed fibers wherein the fibers return to their previous crimped form upon exposure to heat or flame upon melting of a thermoplastic binder.

That I state the essence of the previous paragraph in other wording, namely Hainsworth obtains fabric expansion in the form of creation of an air gap by means of thermal shrinkage differential, whereas in my invention expansion is achieved by means of the release of crimp.

That I consider that it would not be obvious to one of ordinary skill in the art nor would they be motivated to:

1. substitute a different mechanism (crimp release) to increase the fabric thickness into the fabric of Hainsworth by replacement of the thermal differential shrinkage mechanism or
2. introduce an additional mechanism (crimp release) to increase the fabric thickness into the fabric of Hainsworth.

That I consider one of ordinary skill in the art, even for purposes of argument, (by substitution of Erb, Jr., Matsudo, and Assink in Hainsworth) would not render my invention obvious.

That I state it is necessary to consider the deficiencies of three publications of Erb, Jr., Matsudo, and Assink alone and in combination with one another in substitution of the requirements of Hainsworth.

That I note a first substitution in Hainsworth is with Erb, Jr. with the Office wording:

It would have been obvious to have made the woven fabric of Hainsworth be the scrim of Erb, Jr. et al., motivated by the desire to create a fire resistant fabric that has strength yet is lightweight.

That I assert that the above motivation for substitution is incomplete and unclear in that it does not specify if increases or decreases, if any, in weight and/or strength are desired.

That I note that the material of Hainsworth is a woven fabric of a specific structure and that Hainsworth does not teach the use of nonwoven fabrics.

That I again note the following disclosures in Hainsworth regarding the increase in thickness of his invention (on column 2, lines 10 to 14 and column 6, lines 17 to 20 and claim 18----which two latter citations are cited by the Examiner in support of the Office position):

As there is **higher shrinkage** in the fibre on the surface of the fabric after thermal exposure than those on the back, the back fabric will buckle and there will be an **increase the air gap** between the layers. (emphasis added)

. . .

The thickness of EX312 fabric has increased from 0.7 mm before exposure to 4.3 mm after exposure, **with air being trapped between the layers**. This compares to the standard fabric. (emphasis added)

That I address the Office position of combining the teachings of Hainsworth with a scrim of Erb, Jr.

That I state a conventional definition for “scrim” is as follows:

“a lightweight, open-weave, coarse fabric: the best qualities are made with two-ply yarns. Cotton scrim usually comes in white, cream, or ecru and is used for window curtains and as backing for carpets” in accordance with Man-Made Fiber and Textile Dictionary. Celanese Fibers, Inc. New York, NY. 1987. pp 121.

That I submit that the commonly accepted definition of a scrim, as stated above, means the scrim has large spaces between the warp and weft yarns.

That I assert that the air permeability of a scrim, because of the openness, is necessarily very high.

That I assert that if the high shrinkage fabric of Hainsworth was replaced with a scrim as the Office position suggests, because of the high air permeability of the scrim, that air could not be trapped and the air gap of Hainsworth would no longer exist.

That I assert that if one did replace the high shrinkage woven face fabric of Hainsworth with the woven scrim of Erb, Jr. et al., the resulting article would;

1. Still be a totally woven structure.

2. Not increase in thickness by formation of a layer of trapped air.
3. Not increase in thickness under any circumstances by release of crimp.
4. Not necessarily have better strength weight characteristics.

That I further reiterate to support 3. above my observation of Erb from my earlier Declaration:

The construction of Erb is a needled felt which achieves its strength and mechanical properties by means of a high level of mechanical entanglements introduced via the needling process. Even if a thermoplastic binder was included in the construction of Erb, it would not increase in thickness when heated **because of the entanglements introduced by the needling process.**

That I note a second substitution in Hainsworth with Matsuda with the Office wording:

It also would have been obvious to have used Matsuda's crimping process on the p-aramid fibers of Hainsworth et al., Jr. et al. and Assink et al., motivated by the desire to create a fabric that is lightweight and has excellent mechanical properties.

That I assert that the above motivation for substitution is incomplete and unclear in that it does not specify what are the mechanical properties (for example, strength?, elongation?, toughness?, fatigue resistance?, acoustic attenuation?, dynamic loss modulus? etc.) are desired to be changed and the it also does not specify if increases or decreases, if any, in weight and/or the unspecified mechanical properties are desired.

That I note that Hainsworth teaches that both staple spun and filament yarns can be used in his invention (col 3 lines 58-63). Typically, staple fiber from which staple spun yarn is made is crimped. Thus, the citation of Masuda is irrelevant and the article in question from above would still:

1. Be a totally woven structure.
2. Not increase in thickness by formation of a layer of trapped air gap.
3. Not increase in thickness under any circumstances by release of crimp.

4. Not necessarily have better strength weight characteristics.

That I further address fiber crimp in a woven fabric of staple spun yarn (as a fabric of Hainsworth in view of Erb) held in a compressed state. Fabric woven from crimped staple spun yarns derive their strength and mechanical properties from orderly and repeating mechanical entanglements in the form of the twist in spun yarns and the interlocking lay of the yarns over and under each other. These mechanical entanglements are non-labile, and when the fabric is exposed to heat or flame, the crimp in the heat resistant fibers is not released. The fabric will not increase in thickness due to the fibers returning to their form prior to the yarn spinning and fabric weaving. Even if a thermoplastic binder in view of Assink was incorporated into the fabric, it would not increase in thickness because of the non-labile mechanical entanglements introduced during the spinning and weaving process.

That I note a third substitution in the combination of publications is with Assink with the following Office wording:

Assink et al. (US 2004/0028958) disclose a fire-resistant batt and panel that comprises fiber and binder material (abstract). The fiber component can include aramid fibers [0020]. The binder component acts as an adhesive and binder to bond the fibers into a relatively rigid configuration [0022]. A preferred binder can be polyester in a fibrous form or a particle (i.e. powder) form [0022].

Finally, it would have been obvious to have used Assink's polyester fiber binder or polyester powder binder on the fabric of Hainsworth et al. and Matsuda et al., motivated by the desire to create a fabric having greater strength and load-bearing properties.

That I have addressed Assink in my comments above concerning the inapplicability of this publication.

That I reproduce wording, again for the sake of completeness, from my earlier Declaration in the next several paragraphs concerning Matsuda (as well as Erb) concerning a property of entanglement which the Office position has not addressed:

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That I consider that the teaching of Matsuda regarding entanglement represents a disclosure and teaching which is no more applicable than what is admitted to be old in the prior art which is set forth on page 6, lines 16 to 23 as follows:

. . . while previously developed fiber-scrim sheets have concentrated on ensuring a high level of mechanical entanglement of the fibers with the scrim and or with the other fibers in the sheet. Typically, this mechanical entanglement is done by the imparting energy into lofty webs of fibers and/or the scrim that form the sheet to entangle the fibers and densify the sheet. **When this is done, the fibers of the sheet are so entangled they are not free to move when subjected to heat and flame.** (emphasis added)

That I consider the disclosure of Matsuda to require a high degree of entanglement in the heat resistant fiber structure (column 5, lines 6-8) creates a structure in which the fibers "are so entangled they are not free to move when subjected to heat and flame."

That I further consider the additional disclosure of Matsuda to require that the structure of heat resistant fibers be formed by impregnation of the thermoplastic matrix (column 5, lines 30-32) and that the heat resistant fibers are substantially uniformly distributed in the matrix in the sheet cross section (column 5 lines 1-3) to be clear evidence that the final structure would not possess the necessary ability to increase its thickness when exposed to heat or flame.

That I consider one of ordinary skill in the art (1) would not be lead by obviousness to combine the disclosure of Erb, Jr. et al. and Matsuda and (2) for the purpose of argument, even if combined, would obtain an article that would not, increase in thickness at least three times when subjected to heat and flame.

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That I note an Office position is a third substitution with Assink is a fabric of both Hainsworth and Matsuda with the wording:

Finally, it would have been obvious to have used Assink's polyester fiber binder or polyester powder binder on the fabric of Hainsworth et

al. and Matsuda et al., motivated by the desire to create a fabric having greater strength and load-bearing properties.

That I state the deficiencies in Assink have been discussed above.

That I further state in conclusion, for purposes of argument, the combination of the four publications of Hainsworth, Erb, Matsuda, and Assink could not and would not create a fabric which would function as required by Hainsworth with a need for an air gap nor create the nonwoven fabric of my invention which increases in thickness upon exposure to heat or flame by the release of fiber crimp

That I repeat my statement made earlier in this Declaration namely the Office conclusions in application of the four publications to my invention are incorrect.

I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

  
WARREN F. KNOFF

NOV 12, 2006  
DATE